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1 "LATHE WITH PIECES MANIPULATING DEVICE"

The present invention refers to a lathe foreseen of means to manipulate the pieces to be machined, in the sense that the pieces are carried to the place where they are machined and after being machined they are taken away
5 to be substituted for another new piece to be machined, offering in such aspects a functionality which moreover makes the use of the lathe advantageous for its application.

10 Respect to the lathes destined to machining heavy pieces, the placing of conveyor belts installed as accessories of the lathe or even being part of the same is well known.

15 A known realization in this sense is the disposition of a mobile gantry, with moving and manipulation means, in assembly on movement guides situated as an accessory to the lathe. This solution is complicated and bulky, due to the fact that the structure the transporting gantry requires and its functional individuality with means
20 which are independent from the lathe.

Spanish Patent P 0465162 introduces a loader - store of pieces, which can be connected as an accessory to the lathe, having this loader - store some means to place the pieces successively at an outlet, where they can be taken
25 by a tilting manipulator mounted on a shaft. This solution is in turn complicated and expensive and it does not solve in a satisfactory way the complete feeding process and the collection of the pieces to be machined.

Patent EP 0539837 introduces a device with two
30 manipulators, one to place the pieces to be machined and the other to collect them from the lathe once they are machined; resulting this solution complicated and expensive, both for the installation and for its operation.

35 Solutions are also known which have the head and the

1 counterpoint of the lathe in a common trolley which is
movable till a collecting place and store of the pieces,
so that by means of the separation and approaching of the
head and the counterpoint, on the mentioned bearing
trolley of the same, the mentioned pieces are collected
5 and left, moving them between the place of collection or
the store and the place where they are machined, by means
of the trolley movement.

This solution has the inconvenience that as the head
is situated on a movable trolley, the actuation means of
10 the head shall also be incorporated on the trolley, so
that for great actuation powers the trolley needs to have
greater dimensions due to the needed activation means,
which brings also about the need to increase the
dimension of the trolley holding means in its movable
15 assembly.

Patent DE 19911156, on the other hand, includes a
solution in which the head and the counterpoint of the
lathe are incorporated on two independent trolleys which
can be moved on horizontal and vertical guides to move
20 the mentioned pieces between the place where they are
machined and the point of collection or storage point.

In this solution the head is also incorporated on a
movable trolley, which brings about the same
25 inconveniences of the previous solution for high powers,
as the actuation means of the head shall be included in
the corresponding movable trolley. And on the other hand,
due to the upwards movable disposition of the trolleys,
the tool-carrying turret is situated beyond the machining
30 area, so that the shavings and the refrigeration liquids
of the machining fall on the mentioned turret.

In front of all this, according to the present
invention, a lathe is proposed which is based on a
different structural realization, with which the
35 previously mentioned inconveniences of the known

1 solutions are eliminated in an advantageous and practical
way bringing about some functional features which improve
the service of the lathe of application.

5 This lathe object of the invention includes a bench
which determines a structure on which the lathe head is
incorporated fixedly in vertical or in horizontal
disposition, being at least one bearing trolley of a
manipulator guided in the assembly on the mentioned
structure of the bench to move the pieces to be machined
till the machining position and take them away after the
10 operation.

The bearing trolley of the manipulator is situated
in longitudinal movement assembly on the lathe bench
structure, determining the mentioned trolley moreover a
transverse movement disposition and a vertical movement
15 disposition of the set that makes up the manipulating
device.

On the other hand, the disposition of the
manipulating device itself on the bearing trolley
includes an assembly which allows rotation and tilting
20 movements of the manipulating device in a realization
with two operative grips, by means of which they can take
either part independently, in the operating function.

With this disposition, the manipulating device can
25 move and collect the pieces to be machined from a feeding
store and take them to the machining position on the
lathe, as well as taking them away after the machining to
unload them in the outlet container; allowing the double
grip of the manipulating device to collect the piece and
30 leave another one in one only operation movement, both in
the machining place and in the feeding place and the
place of unloading, which eases up the substitution of
the pieces of application on the lathe, reducing to a
minimum the inactivity time of the machining for the
35 substitution of the pieces.

1 Thanks to the fixed disposition of the head on the
structure of the lathe bench, the machining operation can
be established with means incorporated on the head itself
or from means situated independently on the bench with a
transmission from them to the head, which allows the use
5 of activating means of any power without it being
necessary for the head fastening means to have an excess
dimension.

 The head and the counterpoint (if there is one) can
be conventional ones, with the possibility for example to
10 incorporate rollers of 120 millimetre diameter or more,
without it being compulsory for the structure to have an
excess dimension. And also, the pieces can be manipulated
and machined, for example from 10 to 500 millimetre
diameter and 200 to 2000 millimetre length, without
15 having to modify the lathe structure.

 The tool-supporting turret of the lathe can on the
other hand be incorporated on the same bearing trolley of
the pieces manipulating device, which reduces the
necessary activation means to move both elements; being
20 situated this mobile set above the machining area, which
avoids the dropping of shavings and the refrigerating
liquids of the machining on the tool-supporting turret.

 The pieces manipulating device can nevertheless also
25 be situated in a trolley independent from the
tool-bearing turret, which brings about a reduction of
the inactive machining times as the manipulating device
can move and carry out the operations corresponding to
its function while carrying out the machining. More than
30 one tool-bearing turret can also be situated on the same
guides to move the part manipulating trolley, to carry
out simultaneous machining operations.

 Thus, with the lathe object of the invention,
advantages are reached, which make the use during the job
35 to be developed more efficient and practical, making the

1 following aspects to be outstanding:

- The needed time to incorporate and collect the pieces to be applied is reduced.
- A head with a bigger size can be situated without having to increase the dimension of the lathe structure.
- 5 - The fastening of the pieces to be machined is more rigid than with the solutions with mobile head.
- The charging capacity is greater than with the solutions where the head is at the same time the manipulating device.
- 10 - With the fixed head, the tool-bearing turret suffers positioning variations during the first passages of the machining, which are a greater trimming, but the position is corrected by the material recovering, so that in the last passages with a minor trimming the machining is carried out with precision, reaching this way a more perfect machining than with the solutions with mobile head, with which the piece suffers positioning variations during the greater trimming passages, maintaining the uncorrected position till the end of the machining.
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In view of all this, the mentioned lathe of the invention certainly has some very advantageous features, acquiring own life and preferable character respect to the known lathes with the same application.

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Figure 1 shows in schematic perspective a realization of the preconized lathe with vertical head.

Figure 2 shows a lathe realization with horizontal head actuated by transmission from independent means of the same.

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Figure 3 is a perspective of the lathe according to the realization with horizontal head foreseen of actuation means incorporated on the same.

35 Figure 4 is an enlarged detail in perspective of the

1 manipulator with double grip of the lathe.

Figures 5 to 8 are schemes corresponding to several non limitative possibilities of practical realizations of the lathe with vertical head, within the frame of the invention.

5 Figures 9 to 13 show respective schemes corresponding to several non limitative possibilities of practical realizations of the lathe with horizontal head.

The lathe object of the invention has a bench which determines a structure (1), on which the fastening head (2) and rotary activation of the pieces (3) to be machined are situated in fixed disposition.

15 The head (2) can be vertical, as in figure (1), to carry out the machining of the pieces (3) of application situated on it; but it can also be horizontal, as in figures 2 and 3, having in this case the pieces (3) to be machined situated between the head (2) and a corresponding counterpoint (4) or other complementary fastening means.

20 The structure (1) of the bench of the machine determines at the upper part some longitudinal guides (5) on which at least a trolley (6) is incorporated in mobile assembly, in which a manipulator (7) is situated to carry the pieces (3) to the machining position and take them away after the machining.

25 According to a feature of the invention, as it is observed in greater detail on figure 4, the manipulating device (7) is foreseen of two operative grips (7.1 and 7.2), being situated in a tilting disposition which allows to situate the mentioned grips (7.1 and 7.2) indifferently in a position to collect the piece (3) and in an empty waiting position or holding a piece (3).

35 The manipulator (7) is incorporated on a support (8), by means of which it can be moved vertically on the trolley (6) along some assembly guides (9) of the

1 mentioned support (8); while the trolley itself (6) is
situated on a foundation (10), in guided assembly respect
to some transverse guides (11) of the mentioned
foundation (10), thus with the possibility to move
transversely on the same.

5 Thus, thanks to the disposition itself of the
assembly on the support (8), to the disposition of the
support (8) respect to the trolley (6), to the
disposition of the trolley (6) on the foundation (10) and
10 to the disposition of the mentioned foundation (10) on
the longitudinal guides (5) of the structure (1), the
manipulator (7) can carry out all the necessary movements
to collect the pieces (3) to be machined, from a feeder
(12), to carry them till situating them on the head (2)
for their machining; as well as to take the machined
15 pieces (3) to the place of unloading.

Thanks to the double grip (7.1 and 7.2), the head
(7) allows moreover to carry a part (3) to be machined,
to the head (2), for instance with grip (7.1) and by
20 means of grip (7.2) take the piece (3), once it has been
machined, away from the head (2), which reduces
considerably the piece (3) substitution time, as the
incorporation of a new part (3) to be machined and the
withdrawal of the previously machined piece (3) is
25 carried out by means of the same operation that moves the
manipulator (7). In the same way, the withdrawal and
unloading of the pieces (3) can be carried out by means
of the same movement operation of the manipulator (7), if
the unloading of the machined pieces (3) is carried out
30 at the same place where the pieces (3) to be machined are
collected or in an adjacent place.

The tool-bearing turret (13) of the lathe can be
incorporated o the same trolley (6) which supports the
manipulating device (7), with which, by means of only the
35 activation means of the mentioned trolley (6) the

1 movements of the manipulating device (7) can be carried
out to place and withdraw the pieces (3) respect to the
head (2), as well as the movements of the tool-bearing
turret (13) for the machining.

5 Nevertheless, that disposition supposes the
disabling of the turret (13) during the use of the
manipulating device (7) and the disabling of the latter
during the use of the turret (13), which reduces the
productivity level of the lathe considerably.

10 Therefore, the incorporation of the tool-bearing
turret (13) on an independent trolley (14), situated on
the same guides (5) of the upper part of the structure
(1) of the bench, with which the manipulating device (7)
and the tool-bearing turret (13) can be used
15 simultaneously in an independent way, being it possible
to unload a machined piece (3) and collect another new
piece (3) to be machined, while the machining of a third
piece (3) situated on the head (2) is being carried out,
increasing with this the lathe yield, as the empty
inoperative machining times are reduced to minimum.

20 On the same guides (5) of the bench structure (1),
moreover, other accessory trolleys supporting other
tool-bearing turrets and other susceptible manipulators
to carry out multiple operations related to the pieces
25 (3) of application, with some minimum inactive time of
the machining.

Figures 5 to 8 show schematically different
possibilities of the practical disposition of the lathe,
in the realization with the vertical head (2);
30 representing figure 5 a disposition with a trolley (6) in
which a manipulating device (7) and the tool bearing
turret (13) are incorporated, figure 6 shows a
disposition with a manipulating device (7) supporting
trolley (6) and another independent trolley (14) which
35 supports a tool-bearing turret (13), figure 7 a

1 disposition with a supporting trolley (6) supporting a
manipulating device (7) together with a tool-bearing
turret (13) and another independent trolley (14) having a
second tool-bearing turret (13) and figure 8 a
5 disposition with two heads (2) and above both supporting
trolleys (14) of both tool-bearing turrets (13) and an
intermediate trolley (6) with two manipulating devices
(7) in a double manipulating device.

Figures 9 and 13 show in turn different
possibilities of the practical realization of the lathe
10 with the horizontal head (2), representing figures 9, 10
and 11 respective similar dispositions of those
corresponding to figures 5, 6 and 7, in this realization,
while figure 12 is a disposition as the one of figure 9
but with two facing heads (2) instead of one head (2) and
15 a counterpoint (4), corresponding figure 13 to a similar
disposition to that of figure 8, in this realization.

The mentioned possibilities of practical disposition
of the lathe, in both realizations, are nevertheless not
limitative, as others can also be established, fulfilling
20 with the concept of the invention.

The set of tool-bearing turrets (13) and the
counterpoint (4) (if there is one), can also be
substituted for a machining unit which is complemented
25 with the part fixing head (3) for the machining or with
the corresponding fastening and fixing means.

In the dispositions with the horizontal head (2),
moreover a complementary tool-bearing turret (13) can be
incorporated on the trolley situated beyond the machining
30 area, which allows to carry out complementary machining
passages in practically a simultaneous way with each
passage that is carried out with the means of the upper
part, allowing to reduce the time to be used in the
machining of the pieces (3).

35 The fixed disposition of the head (2) assures in any

1 case an immobility which maintains the piece (3) fixing
stable, allowing to reach a machining with a great
perfection.

5 The mentioned fixed disposition of the head (2)
allows moreover that the activation means of the rotary
operation of the plate of the same, can be integrated in
the head (2) itself, as in the realization of figure 3,
or it can have some independent actuation means (15), to
establish, by means of transmission (16), the head
activation (2), as in the realization of figure 2.

10 On the other hand, referring to the fixed head (2),
activation means (15) can be installed of any power and
rollers with great dimensions so that the functional set
results resistant, admitting the machining of big parts
15 (3), without requiring the lathe structure great
dimensions.

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